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ABSTRACT

In Pakistan, academic education is a luxury. Instead, education must be geared to production, solving practical problems, and promoting national development. Since 1951, Pakistan has attempted to bring work and education together and to throw off the structural and attitudinal restrictions of a foreign educational system which strangled tradition, creativity, and initiative. The government's on-going efforts to integrate general and technical education are reflected in the establishment of Agricultural Training Institutions, Vocational Institutes for both sexes, and the Agro-Technical Education Project, which has introduced compulsory vocational education to 1200 schools in the general school system in order to make general education production-oriented. In grades 6-8 in participating schools, one-fifth of school time is devoted to pre-vocational training. In grades 9-10 more specific vocational education is provided in over 60 subjects. Furthermore, the establishment of 26 Polytechnic Schools (one for women) and two Swedish-Pakistani Institutes of Technology has greatly expanded technician training in the country. Admission is by merit to the institutes which teach both technical and management principles in 21 areas. Work and education are combined outside the formal education system in agricultural extension programs, factory on-the-job training, and functional literacy programs. (SB)

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COMBINING EDUCATION AND WORK

Experiences in Asia and Oceania

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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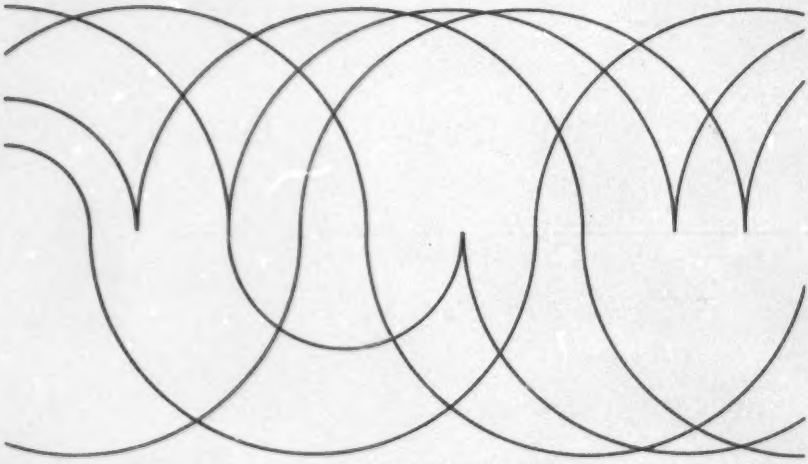

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Pakistan

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CONTENTS

	Page
PREFACE	v
PART I	
A. Introduction	1
B. General Description and Policy Trends	2
C. Work-oriented Education in and outside the Formal System	14
D. Conclusion	16
PART II	
A. Agro-technical Education Project	19
B. Polytechnic Education and Training	26
ANNEX	
List of Vocational Subjects	33

PREFACE

Many countries in Asia and Oceania, as in other regions of the world, are engaged in reorienting their education systems. A basic concern underlying these efforts is to make education functional and relevant to the needs of the individual and of the society. It is increasingly felt that the education systems tend to get isolated from the larger social, cultural and development goals of the society. This isolation is engendered when the process of learning is separated from the context of action and work, and is nowhere as marked as in the failure of education to provide children and youth with an active comprehension of the world of work.

The response to the problem is reflected in a variety of programmes underway in several countries of Asia and Oceania. Considering the importance of the issue, the Fourth Regional Conference of Ministers of Education and Those Responsible for Economic Planning in Asia and Oceania (24 July - 1 August 1978, Colombo) has "Interlinking of Education and Productive Work" as one of the major themes of the Conference.

The country studies presented in the present series were received in response to Unesco's request to the Member States. By the time of going to the press, studies from twelve countries were received and they comprise the present series being issued on the occasion of the Fourth Regional Conference. The assistance of Unesco National Commissions in these countries in having the studies prepared and of the organizations and scholars who have been responsible for them is gratefully acknowledged. These studies cover a wide spectrum of experiences, ranging from experimental projects to comprehensive, system-wide programmes, and detailed descriptions are offered of one or more projects in actual operation. It is hoped to add to the series as more country studies become available.

Opinions expressed in this publication are those of the author and do not necessarily represent the views of Unesco.

PART I

A. Introduction

With time the need for making education directly related to production with the object of improving the quality of life of the rural poor has been coming into more and more vivid focus. In a poor country like Pakistan where an overwhelming majority of the population is engaged in meeting its survival problems, i.e. the problems of hunger, shelter, clothing and disease, the luxury of an academic education is a questionable goal. However much academic education may be seen as a sacred object to be pursued for its own sake, the demands of survival are pressing us into the position where we have to ensure that education must relate itself to more production and gear itself to solving practical problems which are confronting the individuals and the community.

During recent years, there has been considerable talk amongst policy makers to integrate actual work experience with education, and productive physical work is being seen as a rich educational experience in itself. Various programmes attempting to integrate the world of work with education have been launched at various stages of education for different clienteles of the national population. This case study is, therefore, most timely from our national point of view because of our extreme and keen interest in trying to relate education to the developmental efforts of the nation.

The present study is divided into the following sections:

Section B contains historical overview of Pakistan's experience and interest in integrating education with the world of work. In this part major education policies and plans have been reviewed and policy statement on education quoted to document Pakistan's consistent efforts to relate education to productive work.

Section C presents an overview of present programmes of education which attempt to integrate education with the world of work. In this part various programmes of technical education, agriculture education,

non-formal education, adult educat on and work-oriented education at primary, general secon ary and higher levels have been identified and briefly d scribed. The intention is to present an overall picture o the educational scene with special reference to the nati nal effort to bring education and the world of work to ether.

The second part of this re ort, finally, attempts an in-depth study of two major on- oing programmes which seek to integrate education with p oductive work experience. These are the programme of agro-technical studies in the general school system, and echnical education at the degree level. An attempt is m de to first highlight the objectives of the programmes a d then present an account of the steps taken by the overnment and other concerned agencies to implement th programme.

Section D attempts to inte pret the previous experiences and identify the causes of successes and failures with the object of providing the b st possible support to such programmes in the future.

In each part an attempt is made to remain confined to facts and validate each f ct through documentary evidence. Previous policies and p licy documents and plans have been studied and quoted libera lly during the course of this study.

B. General Description and Policy Trends

Pakistan inherited a forei n education system imposed by colonial rulers designe to fulfil their colonial objectives. It was a system w hich attempted to strangulate the local indigenous ed ucational system which had its roots in our culture and t aditions. It also attempted to strangulate local indi genous cottage industry with the object of increasing our r eliance on imported goods and to reduce our inner capac ities to produce what we needed. With the implementation of the system our local institutions through which ed ucation was more or less a community affair were cripple d and started to wither; at places they concealed th mselves in order to survive. The local cottage industr y suffered serious setbacks and by and large was on th e verge of annihilation.

As a result of the foreign educational system proficiency in English was seen as a yard-stick of high educational achievement and academic merit. Creativity, self-direction, initiative and self-reliance were crippled to a point where they were substituted by complete and unquestioning obedience to the orders of superiors who in most cases were foreigners. The concept of evaluation in education came to be seen as something external measured in terms of "passes" and "fails" to be decided by someone outside. With the implementation of the system people learned to scorn and mock at their own culture, language, and traditions. This gave birth to a class of people who, having been educated through a foreign educational system, took positions of responsibility in running the affairs of the state. With these people going into policy-making and decision-making positions it became a self-propelling system.

Pakistan Educational Conference of 1947

With the creation of Pakistan in 1947, one of the very first concerns expressed by the father of the nation in his message to the Conference is reproduced below:

> You know that the importance of education and the right type of education, cannot be over-emphasized. Under foreign rule for over a century, sufficient attention has not been paid to the education of our people and if we are to make real, speedy and substantial progress, we must earnestly tackle this question and bring our educational policy and programmes on the lines suited to the genius of our people, consonant with our history and culture and having regard to the modern conditions and vast developments that have taken place all over the world.
>
> There is no doubt that the future of our State will and must greatly depend upon the type of education we give to our children, and the way in which we bring them up as future citizens of Pakistan. Education does not merely mean academic education. There is immediate and urgent need for giving scientific and technical education to our people in order to build up our future economic life and to

> see that our people take to science, commerce trade and particularly well-planned industries. We should not forget that we have to compete with the world which is moving very fast in this direction.
>
> At the same time, we have to build up the character of our future generations. We should try, by sound education, to instil into them the highest sense of honour, integrity, responsibility and selfless service to play their part in the various branches of national life in a manner which will do honour to Pakistan.

It will be seen that Quaid-i-Azam expressed a keen interest in the study of science and technical training because he saw this as the means for economic development in the country. Similar ideas were expressed by the then Federal Education Minister in his inaugural address in which he said:

> Education is a vast continent and it will make for clearer thinking if we divide it into three provinces, corresponding to the three main needs of human life. *All men need to make a living* - not a bare one, but the best that conditions allow. All men live in a society. All men have a personality to develop and the power of living ill or well.
>
> For all these education must provide, and it must, therefore, include a *vocational element*, a social or as the Greeks would have called it, a political element and a spiritual element.
>
> We must also encourage to the maximum such group activities as are typified by the Boy Scout Movement and are directed towards the promotion of "esprit de corps" and of qualities of physical endurance, self-reliance, courage, initiative, enterprise and social service.
>
> No less important is the provision of facilities for adult education which should aim at banishing ignorance through literacy, improving the general standard of living and breaking the centuries-old isolation of our vast rural community.

Four years later, when Pakistan's first educational development plan was formulated, it was decided that technical and commercial education should constitute an integral

part of the system of general education and the curriculum of our secondary schools be diversified and have technical and commercial content. In practice, it was decided to establish Technical High Schools as a parallel stream to the normal high schools, at that time known as "Academic Schools". The interest in bringing education nearer to the world of work was expressed through inclusion of establishment of twenty-two technical high schools in the first six-year educational development plan. Establishment of more Polytechnics and Engineering Colleges was also recommended. The integration of general and technical education, at that point in time, was proposed to be achieved through allowing a selective number of persons to transfer from the Technical High Schools to Academic High Schools and vice-versa.

In the general educational system there were some attempts to introduce subjects like technical drawing, painting, modelling etc. In the case of Technical High Schools, the subjects which were common in the curricula of Academic High Schools and Technical High Schools, were given a practical productive orientation related to local surroundings. In this connection, the Advisory Committee on Education pointed out that, in fact, the interpretation of the common curriculum will differ materially from one type of secondary education course to another. Geography, for instance, in a secondary school of the technical type will begin with the study of local life and industry and will be re-orientated towards the study of the sources and supply of raw materials, their distribution, the spread and the changing speed of communications, etc.

It was also decided in the first six-year plan to establish trade schools and artisan schools for skilled workers who had dropped out of the formal educational system at the primary or middle stage but had attained some degree of proficiency in literacy so that they could cope with technical courses relevant to their needs. Also considerable emphasis was given to commercial education and the plan envisaged establishment of institutes of commerce at Karachi, Lahore and Chittagong.

In the Technical High Schools a number of trades/ productive skills such as carpentry, metal work, electricity etc. were included as compulsory components in the courses of studies. Workshops were established where practical training in these skills was imparted but these

workshops were not production-oriented and were basically operated as training units. The model could, however, not be expanded, presumably because the cost of equipment for workshops and the recurrent cost of raw materials for training was beyond the financial resources of the government. Moreover, since the courses of studies in these schools were labelled as "non-academic", most students could not enter institutions of higher learning and those who did were at a disadvantage as compared to those who studied in the academic type of schools.

The Commission on National Education of 1958

The next major step to reform education was taken in 1958 by appointing a Commission on National Education to suggest ways by which education in Pakistan might be given a new orientation to meet the needs and the aspirations of our people.

The Commission in its report submitted to the President of Pakistan in 1959 urged the Government to accept the concept of education as an investment in national growth and as an economic asset. Starting from this premise, the Commission said:

> The educational system is the instrument a society uses to equip all its people to lead productive public lives according to their talent and interest. This system must be such that gifted individuals have a full opportunity to develop their skills etc. etc.
>
> We believe that we should continue to fall short of our development goals until full provision has been made for the training of skilled personnel at all levels.
>
> One of our greatest weaknesses as a people is our unwillingness to use our hands and a misconception of the true nature of manual work. So long as this remains a feature of our educated class, progress in developing our country will be slow.

While identifying policy guidelines for higher education, the Commission said that our universities, without neglecting basic theory and fundamental research, should lay greater emphasis on the practical problems

facing our country; for instance much more attention should be given to the problems of economic development in underdeveloped countries such as ours, in particular the problems of rural and agricultural economy.

The Commission emphasized the creation and strengthening of meaningful relationship between the university and the community. It recommended that universities should undertake studies on how the life of the community may be improved and how its problems, whether they are economic, social or educational, may be met and solved. It recommended strongly that members of the university be of service in effecting these improvements in the community. In this connection, the following recommendation of the Commission is reproduced below:-

> We would recommend that the Ministry of Education in collaboration with other appropriate authorities formulate a policy requiring each university student to spend before graduation a certain minimum period in full-time summer work. This can take several forms. First, students may be asked to spend one or two months in gaining 'work experience'. This we consider essential to bring out an appreciation of work and a social awareness of the dignity of labour. Secondly, they may spend this time participating in a programme of civil or military defence, as a short period of national service would be invaluable in promoting a sense of discipline and patriotism. Finally, they may undertake a programme of adult education. In the case of women, particular attention may be given to nursing and adult education.

In the field of engineering, the recommendations of the Commission included introduction of new courses relevant to the developmental needs of the country, a course in social services and humanities to develop in the engineering student an understanding of social and economic forces, and practical training in the field and industries during summer vacations. Satisfactory performance in these latter was to be a pre-requisite for the award of degrees.

In connection with education and research in agriculture and animal husbandry, the Commission recommended that the objectives should be to produce graduates with a high sense of vocation, a determination to apply modern

knowledge to our agriculture development problems as well as the qualities of leadership and personal integrity. The relevant recommendation of the Commission is reproduced below:-

> More specifically, agricultural education at the college level is expected to produce graduates who will return to serve in the following capacities:
>
> (a) as farmers or managers of estates;
>
> (b) in the appropriate sections of the Agriculture Department, Forest Department, Village AID, and other Government Services; in semi-government agencies such as the PIDC, and the Agriculture Finance Corporation;
>
> (c) in the extension services of the Agriculture and Village AID Departments, where they will be charged with the important task of carrying modern agricultural knowledge to the farmer;
>
> (d) in the agencies concerned with teaching and research;
>
> (e) as teachers of agriculture in the secondary schools.

Emphasis was laid on supplementing theoretical study by adequate laboratory and field work.

With regard to commercial education, the Commission recommended two steps: (a) to diversify the school curriculum so that pupils may take up a few elective subjects in the field of technical and commercial studies in addition to the core of compulsory subjects; and (b) to provide special institutions such as Commercial Institutes at which students may take up courses at the professional level.

It was recommended that Commercial Institutes be made a part of Polytechnics wherever feasible. The recommendations included evening classes in commercial institutions and other educational institutions for the benefit of workers in industries and for students preparing to enter a vocation.

Secondary education was recognized as a complete stage in itself and therefore, the objectives, the purpose and method of teaching, as well as the curricula were to be modified accordingly. Secondary education was seen as a stage after which the students would enter a variety of careers and participate in economically useful activities to earn a living. It was, therefore, decided that there should be at this stage a common core of subjects to ensure the development in all pupils of certain basic mental and manual skills and traits of character. This should be supplemented by a range of courses which would, on the one hand, suit the aptitudes of different children and on the other, prepare them for different vocations.

Four aspects of secondary education, namely developing students as individuals, as citizens, as workers, and as patriots, were emphasized. The objectives of the development of a student as a worker are reproduced below:

(a) To cultivate a deep appreciation of the dignity of labour;

(b) To provide full facilities for technical, scientific and other vocational education as preparation for further professional education or qualification of a career;

(c) To provide the services of educational and vocational guidance and thus direct children towards the most appropriate courses and subsequent careers.

The Commission made rather detailed recommendations on work-related subjects to be taught in secondary schools:

> As far as introduction to the practical arts at the secondary stage is concerned, we consider that suitable subjects of the following kind should be introduced as optional for Classes IX and X:
>
> (a) Workshop courses in metal work, wood-work, electricity, for boys of proven aptitude wishing to take up engineering or other construction courses;
>
> (b) agricultural courses, including agricultural crafts for boys wishing to take up agriculture;

(c) commercial courses, excluding shorthand, for those wishing to enter clerical professions;

(d) home economics for girls;

(e) courses in art, artistic and ornamental crafts for both boys and girls.

As a result of these recommendations, courses were diversified at the secondary level and a vocational component was added. A number of Comprehensive High Schools were started with a common core of academic subjects. Workshops and other equipment was provided to run these Comprehensive Schools.

Coming to the question of technical and vocational education, the Commission recognized technical edution as an integral part of general education. The curriculum of general education in schools was diversified by including practical courses in technical subjects, while, at the same time, the curriculum of technical and vocational schools was revised to include courses in social studies and humanities. A network of vocational schools was established for the purpose of training students in manual skills and attitudes for crafts. Evening courses were started in these institutions and new subjects introduced to meet the special requirements of local industries and employers. Efforts were made to integrate training with the world of work by getting industries to provide systematic training to skilled workers and to develop their own training schemes in terms of their specific job requirements. Boards of Technical Education were established for conducting examinations in technical subjects.

Eight years of compulsory schooling were recommended, based on the rationale that this is the minimum period needed to prepare a child to lead a productive life and take his responsibilities as a citizen. The relevant extract from the Commission's report reads as follows:

> When the full compulsory schooling of eight years has been instituted, this stage of education will include some craft instruction and pre-vocational courses. In the meantime we must set realistic aims for a five year course. While making children completely functionally literate must remain a basic and constant concern at this level, we must remember that functional literacy in itself is not enough. We should, therefore, strive to keep the

aims of our primary education sufficiently broad so as to equip pupils to lead full and productive lives, to be prepared to pursue further education with profit and to lay the basis for the future expansion of the compulsory course into a full eight year one.

The Education Policy 1972-80

The Education Policy 1972-80 clearly reflects an increased emphasis on relating education to the world of work, and integrating general and technical education in a manner that horizontal movement from one to the other and vice versa are possible for a student. In this connection, the following objectives of the Education Policy are particularly significant:

Building up and nurturing the total personality of the individual, dynamic, creative and capable of facing the truth as it emerges from the objective study of reality: an individual able to comprehend fully the nature of technical and social change and having deep concern for the improvement of society.

Designing curricula relevant to the nation's changing social and economic needs compatible with our basic ideology and providing a massive shift from general education to more purposeful agro-technical education.

Providing a comprehensive programme of studies through the integration of general and technical education and by keeping options open for transfer from one course of study to another.

Education is to be made compulsory in a phased manner from class I to X. As regards education from class VI to VIII, considerable emphasis is being laid on revision of curricula to eliminate academic over-loading, to emphasize learning of concepts and skills and to encourage observation, exploration, experimentation, practical work and creative expression. Great importance is attached to the dignity of labour and to creating in the students motivation for productive service for the welfare of the

community. The Policy envisages provision of workshops in all schools so that the pupils may engage in activities such as basketry, wood-work, metal work, home industries and environmental sanitation. In this connection, the Policy stipulates that:

> The system of elementary education will be so designed that the knowledge and skills imparted, attitudes implanted, and the learning methods employed will ensure that those not proceeding to secondary education can be usefully absorbed into the economy of the local community. For those leaving school after class VIII, special courses of training in the skills of their vocational interest will be provided in the school workshops. It is essential that children who drop out after class VIII should carry with them enough skills to return to their local or ancestral vocation as better farmers of craftsmen.

Coming to secondary and intermediate education the Policy clearly states that while expanding education, it should be related in its form and content to the nature and scope of our economic development and should cease to be an abstract academic endeavour:

> It is essential that a boy who leaves school after matriculation/intermediate is ready to accept social responsibility by getting absorbed in our socio-economic framework as a trained, middle-class technician or worker. For this purpose, vocational and occupational subjects are being added to general education at this stage.

The Policy envisages a shift towards science and technology with the object of integrating general and technical education into secondary schools. It also envisages an integrated science course. In this connection, the relevant extracts from the Policy are reproduced below:

> In the past the general tendency has been to establish separate institutions for technical education. These institutions have not always produced efficient industrial workers. The education given to them also lacked the necessary cultural content

and, in practice, they catered for the rejects of the general stream and a certain stigma was attached to their programmes. The new programme will provide for progressive integration of general and technical education...

The integration of general and technical education will equip secondary and college students for gainful employment, including self-employment, for industry, agriculture, business, home economics and education in addition to providing them a programme of general education. The areas of vocational occupational studies for which facilities will be developed include:

> electronics; auto-electricity; plumbing; household electrical appliances; dairy farming; poultry farming; vegetable farming; sericulture; crop and livestock production; shorthand; typewriting; insurance and estate broking; clearing; forwarding and shipping practices; home management; cooking and baking; first aid and home nursing; food production and preservation; etc. ...

An integrated science course, including mathematics, biological and physical sciences, will be introduced at the High and Intermediate stages with a view to giving students a more comprehensive and diversified preparation enabling them to have a wider choice at the time of entry into higher institutions of professional and general education.

On the question of technical education, it was decided to convert Polytechnics into Technical Colleges leading to a degree. The importance of the world of work was recognized by the provision that for the purpose of admission to B. Tech. programmes two years practical work in industry would be considered an additional qualification.

In addition to the normal courses, a variety of new areas of technical subjects were introduced which include textile technology, para-medical training, mineral technology, printing and graphic technology, timber technology, oceanography and marine engineering, plastic and rubber technology, gas and petroleum technology, ceramics and glass technology, and development economics.

Combining education and work

With the object of providing continuing education to adults and out-of-school youth a number of steps are envisaged in the Policy ranging from a wider use of T.V./ Radio to supporting functional literacy programmes. An Open University was inaugurated and factory schools and farm schools were established.

In accordance with the Education Policy 1972-80, a compulsory vocational component has been introduced from class VI to X taking about 20% - 25% of the total teaching time in the school. Workshops have been established, and teacher training programmes for vocational teachers have been introduced. Innovative steps have been taken to bridge the gap with regard to equipment and buildings. A detailed description of these measures follows in Part II of this study.

C. Work-oriented Education in and outside the Formal System

Agro-technical and vocational subjects education

Agro-technical subjects have been introduced in general education as an integral part from classes VI to VIII, whereas vocational subjects have been introduced from classes IX to X. Both are meant to be pre-vocational in nature, in that the technical knowledge gained is expected to develop the mind of the student, his sense of creativity, and ability to cooperate with others in improving the social and economic conditions of the community. Agro-technical and vocational subject education borrow the means and the technology, the organization and the work of vocational education but still retain a special character. The vocational subject education is an extension of the agro-technical studies; the teaching methods employed, i.e. the 'project approach', are the same. Children, through instruction in the school, become capable of producing saleable items at home.

A more detailed account of the agro-technical education project is given in Part II of this report.

Polytechnics and Swedish-Pak Institutes of Technologies

At the time of independence, technical education in Pakistan was in a difficult phase. The founder of the nation immediately established a Council of Technical Education, recogizing the importance of technical education as a means of raising productivity and accelerating economic growth. Technician training programmes in Pakistan underwent remarkable quantitative expansion during the past twenty years. Beginning with the three conventional fields of civil, electrical and mechanical engineering, the polytechnic institutes now offer courses in as many as twenty different areas of specialization. In institutions established through the assistance of the Swedish Government, production units have been set up. There are two such institutions, called Swedish-Pakistan Institute of Technologies. Their students are encouraged to work in the production units and earn something which helps in developing the right type of skill in a particular field of specialization. The production units in these institutions make them partly self-financing.

A more detailed account of technical education in the Polytechnics is given in Part II of this report.

Agriculture education and extension services

Universities in Pakistan offer courses in such new disciplines as food science and technology, plant protection, or extension education, as well as short courses in forestry, fishery, agro-polytechnics etc. Agricultural Training Institutes are operating at Sargodha, Rahimyar Khan, Peshawar and Sakrand. These institutions train for a two-year diploma in the 'Field and Stock Assistants' courses and deal with extension education. An attempt has been made to integrate education with rural development and the courses have been introduced and taught in various "Markazes" and through mass media such as radio, television, etc.

On-the-job training

Through the Industrial Training Acts, various industries are running training centres on their own premises mainly in order to train the manpower they themselves require. The courses have been specially tailored by the industrial organizations to suit their own requirements.

Their awards have not been recognized by any agency such as technical or general examination boards. A few professional bodies such as the Institute of Engineering, ICAP, PIIA, etc., have been established and are conducting examinations. Their awards are being recognized in their respective fields but these are not academic awards. Various Polytechnics, vocational institutions, commercial institutions and privately managed organizations are also running evening courses leading to certificates.

Vocational training for boys and girls

Various vocational institutes are functioning in Pakistan both for boys and girls. Craft courses such as brick-laying, carpentry, welding, fitting, tailoring and dress making, hair dressing, cooking and food preservation, etc., are being conducted in an organized manner. Their awards enjoy national recognition and have been found very useful in training the manpower for certain jobs. The Vocational Institutes for Girls are particularly popular as they are situated within the residential areas of cities. Industrial homes have also been established for such training. In Pakistan, there is only one women Polytechnic which offers diploma and certificate courses, in such fields as television technology, dress making and designing, etc.

D. Conclusion

It will be seen that at the policy level, the desire for combining education and productive work experiences has been growing consistently. This desire has been reflected in the following manner:

(a) Inclusion of practical crafts and vocational subjects in the general school system.

(b) Establishment of Polytechnics and other technical institutions in the country to provide vocational training geared to the potentials and economic needs of the community.

(c) Initiation of a number of programmes of vocational training of adults and out-of-school youth.

(d) Attempts at involvement of industries and the community in providing practical work experience to school children.

(e) Gradual integration of general and technical education.

While in 1947, it was only envisaged to establish a few Pilot Technical High Schools on an experimental basis, in 1959, as a result of the report of the Commission on Education, a number of Comprehensive High Schools with a compulsory skill component were established in every district and in 1972, in accordance with the decisions of the Education Policy 1972-80, it was decided to introduce a compulsory vocational component in the entire school system.

The number of Polytechnics is constantly increasing and new vocations/skills are being included in their courses of studies to cater to the demand for new vocations in the community. Moreover, practical work in industries is getting increased emphasis, not least because it is being seen as a valuable educational experience.

In the field of adult education, the emphasis seems to be shifting from pure literacy to training in functional literacy which would be economically productive. As a matter of fact, skill training in productive skills is being seen as a starting point for literacy programmes in order to make the skills of literacy meaningful to the learner.

It may be relevant, at this point, to analyse briefly the most recent experience of attempting to introduce vocational skills in the general school system. When implementation began, the existing rigid structures of formal education turned out to obstruct this new scheme in more than one way:

(a) The vocational skills included in the formal education system were confined to a few conventional skills like wood-work, metal work, electricity etc. whereas other indigenous productive skills such as sweet making, cottage cheese making, etc., were not seen as vocational skills fit to be included in the school curricula;

(b) There was resistance to the idea of involving community members who were very often without any formal credentials, in imparting vocational skills in the formal educational system;

(c) The possibility of using small indigenous community workshops and equipment for imparting skill training to children in the formal educational system was rejected in many cases; it was considered that only adequately equipped workshops on the premises of the schools could be used for imparting skill training to school children;

(d) The rigid financial rules operating within the educational system made it very difficult to combine earning and learning.

A number of innovative and unconventional approaches have been and are being contemplated and used in experimental settings to include indigenous trades in the school curriculum, involve community members in skill training and combine earning with learning. These are taking place in isolated settings and are being run by a few innovative educators; yet they have succeeded to a point where they may be demonstrated for replication on a national scale.

At present, compulsory vocational education has been introduced in only about 1,200 schools in the country. Budget provisions for purchase of equipment which necessitate heavy financial commitments on the part of the national exchequer are yet to be secured. Moreover, the problem of producing standardized equipment, the problems of its distribution and replacement, or the problem of teacher training loom large in the implementation of the scheme.

Whether all the necessary funds, equipment, and teachers can be made available to implement this programme, or innovative strategies involving a modification of recruitment, administration and financial rules would be used, is a question which still remains to be answered.

It is, however, gratifying to note that at the policy level, there is a search for unconventional and innovation approaches to combining education and productive work. How soon and how smoothly these can be implemented, will depend upon a number of factors both within and outside education.

PART II

A. Agro-technical Education Project

In 1972, after hearing the views and advice of people from all walks of life, including experts, laymen, teachers, students and parents, a New Education Policy was formulated. This policy laid great emphasis on a massive shift towards science and technology. New curricula have accordingly been prepared and implemented from classes I to X. In these new curricula, agro-technical education has been introduced as a compulsory component from classes VI to VIII. The subject is being taught at a rate of eight periods per week. With a total of 45 periods per week in classes VI to VIII, close upon one-fifth of the school time has been devoted to agro-technical studies. In fact, many children are engaged in this form of work education beyond the normal school time, as the teaching is through a project approach. For example, a pupil may select the tailoring of a shirt as a project. All preliminary work such as planning, measurement, layout, cutting etc. is taught in the laboratory under the supervision of a specialist teacher. The pupil starts working under instructions from the teacher, but it is quite common that she may complete part of the work at home. Thus the pupil is engaged in some useful activities even at home.

In classes IX to X, agro-technical education is continued under a different name, i.e. vocational education. A total of nine periods per week are allocated to this subject. At this level the skill potential will be developed further by training students in a larger number of more specifically defined vocational subjects. The areas selected are the same as those in agro-technical education, but commerce and general occupational groups have been added. The entire list of vocational subjects may be seen in the Annex.

Fully equipped workshops and elaborate equipment are not essential pre-requisites for the introduction of such subjects into the school system. Workshop agricultural farms, or home economics laboratories and equipment

may facilitate the full implementation of the programme, but in places where facilities are not available the schools are still expected to introduce some crafts, drawing upon the resources available in their respective communities.

Considered an integral part of general education, agro-technical and vocational education is meant to be a basic preparation for life. By providing a link between general and vocational education, agro-technical education has importance in helping a person to discover his talents and to use them in working towards a meaningful and satisfying carrer.

Objectives

The general purpose of agro-technical and vocational education is to broaden, enrich, and modernize general education and to make it production-oriented.

It will seek to accomplish the following objectives:

(a) To develop in each student a measure of skill in the use of common tools and machines;

(b) To develop problem-solving skills relating to materials and processes;

(c) To discover and to develop creative technical talents in students;

(d) To provide all-round technical knowledge and skills;

(e) To develop understanding of technical culture;

(f) To develop consumer knowledge;

(g) To develop worthy leisure time interests;

(h) To develop an understanding of the application of science and mathematics;

(i) To provide adequate experience for those students interested in technical work;

(j) To provide vocational training for students who would not otherwise have this opportunity.

Contents

Agro-technical and vocational education covers four main branches. They are:

(a) Industrial Education
(b) Agriculture Education
(c) Home Economics Education
(d) Commercial Education

At the elementary level, from classes VI to VIII, agro-technical education is being introduced in the following branches:

(a) Industrial education

Industrial education comprises woodwork, metalwork and applied electricity. At this level, as one teacher has to teach the elements of three important trades to the students, the purpose of agro-technical education must be simply to create a kind of motivation for technical knowledge, and to develop in each student a certain degree of technical competence.

(b) Agriculture education

Agriculture education comprises the study of agriculture and horticulture, animals and birds, insects and bees. It also concerns the introduction of multiple agricultural activities at middle school level. These activities are mainly designed for schools located in rural areas. However, it has been agreed that 20% of the schools in rural areas will implement industrial subjects instead of agriculture, and 20% of schools in urban areas will implement agriculture instead of industrial subjects. As far as the rural community is concerned, a close cooperation should be set up between the school and the community with a view to studying the agricultural processes of the area and improving them, as well as encouraging production with regard to the characteristics of the area.

(c) Home economics education

Home economics education comprises sewing, foods and nutrition, family living and child care, and is meant essentially for girls. Since it has to be adapted to the needs of

the community, its application may vary from one region to another, as habits and customs differ from one place to another. However, the educational value of home economics for the whole country will remain the same at the middle school level. In addition to helping girls become better wives and mothers by training in home management generally, it will also be a motivation for future employment and a possible orientation towards textile design and clothing production, hotel management, catering management, hospital nursing etc.

Pre-vocational nature of agro-technical education

The purpose of agro-technical vocational subjects as part of general education is to enrich the educational background of a person and to make him a useful citizen capable of helping himself and his society, while vocational training proper concentrates on preparation for gainful employment. Agro-technical education has its educational purpose in encouraging the sense of invention by the production of socially useful things. It also aims at helping students understand the industrial revolution and the industrial civilization which is predominant at the present time. It provides a foundation for subsequent courses of vocational education, by producing better motivated and skilled students for the latter. The students coming from an agro-technical education programme may eventually specialize in industry or in a technical field, but agro-technical education is not vocational education. It can only be considered as a link between general education and development which is generally based on manual work and production.

Agro-technical education is actually the introduction of multiple activities in industrial arts, agriculture, and home economics. 'Multiple activities' here means that all the students in classes VI to VIII should be trained in the different disciplines of the section either by rotation or simultaneously. For example, all the students in the industrial education section, whether they are trained in a general comprehensive shop or in separate workshops should study woodwork, metal work and applied electricity. There may be weekly periods of each subject, one subject per term, or one subject per year over the 3 years. In the

home economics section, the students study sewing, foods and nutrition, family living and child care in a similar manner. The ideal agro-technical teacher should master these multiple activities - except in the case of large classes where two or three teachers are needed to work at the same time. While 15-16 students per teacher are considered ideal, one teacher is usually teaching 20 students at a time. The same system should be applied to the agriculture section.

It should be kept in mind that sufficient resources, in terms of quantity and quality of the required teachers, of school facilities, and of financial provisions are a pre-requisite for the provision of such pre-vocational education in general secondary schools.

Teaching methods

Special methods of teaching and special teaching/learning situations are developed by the use of a "project approach" in which the workshop becomes the classroom. Practical activities based on a project rather than a repetitive series of exercises have been developed and theoretical knowledge is imparted as related information as and when necessary and applicable. The previous concept of theory followed by practical activities has been demonstrated to be educationally unsound in the field of pre-vocational education.

In the prescribed curricula certain projects have been suggested but it must be emphasized that these are not compulsory. The teacher himself, with the co-operation of the children and/or their parents, suggests projects which will not only give the required skills, but will also be relevant to the local community and related to the everyday life of the child.

The approach also encourages teachers and students to collect waste materials and to turn them into socially useful things, either at home or at school.

The use of charts and diagrams, the use of audio-visual aids locally made by the teacher, the collection of old parts of machines for study and demonstration, etc., contribute to reduce the expenses, so that the cost per capita for agro-technical education is lower than one might expect. In this regard the main role in the implementation of agro-technical education is being played by the teachers themselves.

Problems in the implementation of the scheme

At the time of introducing agro-technical and vocational subjects education, the following problems were faced:

(i) Equipment: Sufficient basic implements were not available. The Ministry of Education in collaboration with the Provincial Governments were, therefore, providing equipment to 1,000 selected schools at middle school level and 200 selected schools at high school level. For this purpose, more than 30 million rupees were reserved. Tenders were invited and orders were placed with the firms. Frequently, the requirements of a special type of equipment were so large that the firms could not supply them because the markets were not prepared to produce and supply in such a large quantity. In order to encourage the production, standard drawings and specifications for items needed for the implementation of the scheme have been prepared and it is hoped that this may ensure better supply conditions in the future.

(ii) Teachers: Properly trained teachers are a *sine qua non* for the successful implementation of agro-technical education. There is a need for a teacher training system which lays sufficient emphasis on the skill component. A careful analysis of the existing situation was made and the following five categories of teachers were identified:

Category I	Teachers who have mastered the skills of multiple activities and the corresponding vocational teaching methods, and who only need a clear understanding of the concept and objectives of agro-technical education.
Category II	Teachers who have mastered the skills of one trade and its vocational method, but who need further training in the other trades as well as a clear understanding of the concept and objectives of agro-technical education.

Category III	Teachers who have mastered the skills of multiple activities, but who need further training in educational subjects.
Category IV	Teachers who have mastered the skill of one trade, but who need further training in the other trades as well as in educational subjects.
Category V	Teachers who have mastered a scientific speciality and its general teaching methods, but who need further training in multiple activities as well as in educational subjects.

Teachers falling into categories I and II were given a six-week induction course in six newly established National Agro-technical Teacher Training Centres. The situation with regard to teachers has been improving but more effort is needed.

(iii) Workshops laboratories: In some schools, workshops or home economics laboratories were available. In the many schools where such facilities were not available new buildings have been and are being constructed. Since the building cost component weighs very heavily, one of the Engineering Universities has proposed various low-cost designs for workshops. At some places, existing rooms and verandahs have been converted into workshops.

As regards land for agriculture, almost all schools have enough space to be used as school farms/working areas for children. Visits to nearby farms are also encouraged.

(iv) Inspection and supervision: This is still a difficult aspect of the agro-technical scheme as most school heads and inspection staff are without any training or experience of teaching agro-technical subjects. However, in various areas 2-3 days seminars for senior administrators,heads of the schools,inspectors etc., were carefully organized.

(v) Examinations: In Pakistan, the Matriculation examination is still considered to be very important. Unfortunately, all Secondary Examination Boards have expressed their inability to examine on vocational subjects. This may push agro-technical education to a low priority from an examination point of view.

B. Polytechnic Education and Training

Immediately on gaining independence in 1947, the country was faced with staggering problems. In education, the immediate task was to save the general education system from collapse. No organized system of technical education was in effect in 1947. Under the dynamic leadership of the founder of Pakistan, a Council of Technical Education for Pakistan was established. A committee appointed by this Council submitted its interim report in February, 1949. This report included a proposal for establishment of polytechnic institutes at Karachi and Dacca. Earlier, two Technical High Schools had been established, one in Karachi and one in Dacca. Preparation of the plans for the Karachi and Dacca Polytechnics began in 1953. At the same time, an undetermined number of non-standardized trade, technician, and vocational schools were springing up.

The original scheme proposed that the Polytechnics should offer three-year engineering diploma programmes in three technologies, and short-term specialized courses in eighteen different trades. The scheme underwent many revisions and, finally, six technologies were to be offered instead of three. Trade courses were to be offered only if physical facilities could be spared after the full-time technological programmes. While the revised scheme did not exclude trade programmes in day time, it was anticipated that little would be available except in the evening. The plan at Karachi Polytechnic of using facilities primarily for technicians courses, and for artisan and apprentice training only when facilities are available, has become the pattern for all Polytechnic Institutes in Pakistan.

The first class was registered at Karachi Polytechnic in 1955. The curriculum then comprised only Mechanical and Electrical Technology. Annual output was subsequently increased by adding more technologies and opening new institutions throughout Pakistan. Two Swedish - Pakistani Institutes of Technology have been established with the assistance of the Swedish Government, one at Karachi and one at Gujrat. Both these institutions are offering a three-year diploma in various disciplines and their awards are equivalent to the Polytechnic Institutes. These two institutions have production units attached and the students are working alongside experienced workers employed on a permanent basis. The production units are functioning on a marginal profit basis.

Today, 25 Polytechnics, including two Swedish-Pakistani Institutes of Technology plus one Women's Polytechnic are functioning in Pakistan with an enrolment capacity of about 4,600 students. The product of these institutions is equipped to possess:

- skill in certain industrial processes;
- an understanding of the principles underlying these processes and skills; and
- an experience in handling the industrial worker in a competitive field in which efficiency is essential.

It is the possession of the last two qualities which differentiates the technician from the operator of machines, permits him to understand intentions of engineers and executive staff and interpret these to the skilled and semi-skilled workers.

Courses offered

Instructions in the following trades are being provided:

1. Electrical
2. Mechanical
3. Civil
4. Air-conditioning and refrigeration
5. Radio and electronics
6. Television
7. Auto and diesel
8. Auto and farm machinery
9. Chemical
10. Machine shop
11. Drafting and designing
12. Foundry and pattern making
13. Textile weaving
14. Textile spinning
15. Power
16. Metallurgy and welding
17. Watch repairing
18. Tailoring and dress making
19. Architecture
20. Public health
21. Tool design and tool making

Combining education and work

Students having studied chemistry, physics, and mathematics in addition to the general subjects and having passed Matriculation (Grade X) are eligible for admission. In some Provinces geometrical and technical drawing is also compulsory. Generally matriculates with at least second division succeed in getting admission as it is on merit basis. When the scheme was introduced, the allocation of the technologies was made on the basis of the first year's result and aptitude of the students. The first year was common. This practice led to enormous problems and has since been abandoned. Today the allocation of the technologies is made at the time of initial admission. The first year courses are still common except for civil and architectural technology where geometrical and technical drawing is a compulsory subject for admission and civil engineering drawing is taught in the first year. Training in vocational skills, which serves as a base for subsequent training as technician is imparted in the first year. This means that a student enrolled for any technology other than Civil has the option to change to another trade even after his first year, provided a vacancy exists.

Shops and laboratories have been planned to accommodate class sizes of 30 to 35 students. With time, the background of applicants has improved and the selection methods have been refined; today the enrolment in first year has gone up to 40. Even then, thousands of applicants are refused admission every year for want of seats.

Teaching staff

All instructors teach both theory and practical work in their special fields. Theoretical and practical lessons account for 50% of the time each. For senior teachers, few hours of teaching in practicals are assigned but they must be willing to teach practical work when necessary. For laboratory or shop instruction, properly qualified shop staff are provided who are responsible for making the preparation and help the teacher in practical activities. Each technology is headed by one Head of the Department who has senior instructors, instructors and junior instructors responsible for teaching theory and practical. The larger Polytechnics have Vice-Principals to help and assist the Principal. As a normal practice, even Principals and Vice-Principals are assigned teaching

duties. Other duties such as student guidance, preparation of instructional material, shop and laboratory development are also taken into consideration when assigning teaching load. Teaching is done at the rate of one period of fifty minutes for theory and one practical of three continuous periods i.e. 150 minutes. An academic year is divided into two semesters of 18 weeks each. One theory period is considered as one credit, and so are three continuous periods of practical.

There is no pre-service teacher training arrangement for technical teachers. However, in order to provide in-service training opportunities, several Polytechnics have attached Teacher Training Wings and are offering a Diploma in Technical Education. This full one-year course is conducted on a regular basis, taught part-time as well as full-time. All educational facilities of the Polytechnic, to which this Wing is attached, are utilized for teacher training.

Maintenance and safety

For quality instructions, good housekeeping is essential. It is important that students develop good working habits. They have a responsibility, therefore, to see that the next class finds machines and laboratories clean. In addition, shop attendants are responsible for the maintenance of cleanliness. Machines are oiled as often as needed. During damp weather exposed metal surfaces are protected with rust preventive material. All tools such as drills, screwdrivers, chisels, saws etc. are kept sharpened at all times. A small maintenance unit in each Polytechnic is looking after all this.

Accidents in shops and laboratories are always traceable to two kinds of causes: (i) those caused by faulty conditions of the room and equipment and (ii) those caused by inefficient instruction and management. Teachers, therefore concentrate their efforts on the elimination of hazards, and teach accident prevention at the time the student is introduced to the use of each machine and each piece of equipment.

Grading and examinations

Initially, testing and grading was the internal affair of the Polytechnics. So-called letter grades were awarded in the following order:

Letter grade	Level of accomplishment	Corresponding numerical grade	Grade point value	Grade point range
A.	Excellent (accomplishment merits special recognition)	80 to 100	4	3.3-4.0
B.	Good (accomplishment above average)	65 to 80	3	2.5-3.2
C.	Average accomplishment	50 to 65	2	1.7-2.4
D.	Unsatisfactory (accomplishment below standard promotion conditional	40 to 50	1	1.0-1.6
E.	Failing	Below 40	0	0-0.9

Students were deemed to have successfully completed their course of study after completing the following:

(a) Passed all of the courses offered in their curriculum.

(b) Earned a 2.0 grade point average in all courses taken during the three years.

(c) Received passing grades in the final Diploma Examination held annually by the Provincial Board of Examination for Technical Education.

Due to the increase in the number of Polytechnics and with a view to maintaining uniformity in achievement standards, the West Pakistan Board of Technical Education conducted its first examination in 1965 for the sixth semester only. Later the Board started examining the 2nd and 4th semester as well. The West Pakistan Board of Technical Education has since been disintegrated into three Boards, namely the Punjab Board of Technical Education, Sind Board of Technical Education, and NWFP Board of Technical Education. All these bodies have their own charter and follow a slightly different approach in conducting examinations. They are no longer awarding 'letter grades' but have switched over to the normal system of marks and division, because all other Universities and Boards are doing the same.

Survey on the effectiveness of Polytechnics

The Polytechnic Scheme has provided a large number of skilled technicians in Pakistan, and has thus given strong support to the industrial infra-structure of the country. As stated earlier, various changes have occurred with the introduction of the Education Policy (1972-80). Inter alia, the curricula for the Polytechnics are being revised, though no changes have yet been implemented. Before undertaking the revision, a research study was conducted in 1973 with the objective of:

- determining the needs of industry for technician/supervisory level training.
- determining the type and contents of technicians training required by the employing agencies.
- assessing the causes of unemployment and under-employment of Polytechnic graduates in as much as it relates to curriculum deficiencies.
- designing a curriculum, which can enhance the employability of Polytechnic graduates.
- determining the extent of specialization in various technologies or within a group of technologies.
- determining the need and type of higher education for Polytechnic graduates.

The study surveyed a cross-section of Polytechnic graduates as well as the establishments which employed them. The survey report brings to light some striking points, such as:

(a) Industry requires industrial technicians/supervisors with proficiency in trade skills rather than engineering technicians.

(b) The Polytechnics should function as training institutions and not as educational institutions.

(c) As training institutions the number of their product should be related to employment market needs.

(d) A system of periodical evaluation of the institutions should be introduced, and

(e) Closest possible co-operation and co-ordination should be established with industry.

Based on these findings, the task of revision of the Polytechnic curriculum was undertaken in the context of the objectives of the Education Policy, the needs of the society, and the existing Polytechnics curriculum.

Problems requiring solution

Curricular revisions apart, Polytechnic education faces the following problems:

(i) Teachers: Due to the demand in neighbouring and in developed countries, technically trained manpower is leaving the country. This has caused a shortage of teaching staff. The teacher training programme, therefore, needs to be looked into, and the pay structure needs to be brought in line with market rates. A satisfactory arrangement for staff development and for the training and retraining of teachers, supervisors, vice-principals/Principals, Directors of Technical Education, and various other administrators must be established.

(ii) Raw materials: This is an area which can make education expensive. If eventually all the Polytechnics were to be converted into production units, then these educational institutions could be made self-sufficient. At present, however, the raw materials for projects etc. are provided by the Government in insufficient quantities. Moreover, prices of raw materials are always increasing. This causes great frustration amongst teachers and taught, as it is difficult for the Government to adjust their allocation accordingly.

(iii) Equipment: Some equipment has become obsolete and needs to be replaced. New technologies are also springing up which call for preparation and organization of the Polytechnics on different lines.

(iv) Collaboration with industry: This is an area which must be looked into. The survey conducted in 1973-74 called for a sound collaboration between industries, markets and Polytechnics. One possible suggestion is for a Council to co-ordinate between trade, industry, manpower and education, and to ensure that the output from Polytechnics is suited to the needs of the country.

ANNEX

List of Vocational Subjects

General Field

1. Education (pedagogy)
2. Health and Physical Education
3. Journalism
4. Nursing and First Aid
5. Civil Defence
6. Commercial Photography
7. War Studies
8. Local Community Crafts

Commercial Field

1. Advanced Shorthand and Typing
2. Accounting
3. Insurance
4. Salesmanship
5. Banking and Finance
6. Import and Export Procedures
7. Market Surveying

Agricultural Field

1. Principles of Farm Management
2. Principles of Increasing Crop Yields
3. Control of Weeds, Pests and Diseases of Common Crops
4. Care of Domestic Animals and their Young
5. Common Crops, Soils and Fertilizers and their relationship with one another
6. Principles of Livestock Breeding
7. Sheep Breeding
8. Poultry Farming
9. Dairy Farming
10. Floriculture
11. Agriculture
12. Sericulture
13. Pond Fish Culture

14. Vegetable Growing
15. Fruit Growing
16. General Forestry
17. Principles of Agriculture Marketing

Industrial Field

1. Automobile Servicing
2. Auto-electricity
3. Radio and Television Servicing
4. Refrigerator and Air-conditioner Servicing
5. Wood Work
6. Metal Work
7. Leather Work
8. Wood Carving
9. Pottery and Ceramics
10. General Electrician Practice
11. Plumbing and Pipe Fitting
12. Civil Draftsmanship
13. Mechanical Draftsmanship
14. Surveying
15. Tracer Practice
16. Welding Practice
17. Painting and Colouring of Buildings
18. Dyeing,Dry Cleaning and Laundry

Home Economics Field (Cottage Industries)

1. Drafting and Garment Making
2. Hand and Machine Embroidery
3. Hand and Machine Knitting
4. Textile Printing
5. Weaving and Rug Making
6. Toy Making
7. Basketry and Cane Work
8. Food Preservation
9. Confectionary, Bakery and Sweetmeat Making
10. Kitchen Gardening
11. Farm Household Management
12. Child Care and Home Nursing
13. Home Management

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